

# **TWRA Fisheries Report 02 - 06**

## **SURVEY OF THE TROUT FISHERY IN THE OBEY RIVER**

### **BELOW DALE HOLLOW DAM**

**March – October 2001**

**Final Report Submitted To**

**Tennessee Wildlife Resources Agency  
Nashville, Tennessee**

**By**

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## EXECUTIVE SUMMARY

1. The fishery in the 7 km of the Obey River below Dale Hollow Dam was investigated between March and October 2001 using a roving creel survey.
2. Fishing pressure over the survey period totaled 27,945 h (90% confidence interval,  $\pm 3,814$ ). Average trip length was 2.56 h and anglers made 10,914 trips to the tailwater.
5. The catch rate for rainbow trout was high, averaging 1.14 fish/h. This high rate was probably influenced by the high frequency (every week or two) of stockings of rainbow trout. The catch rate for brown trout averaged only 0.05 fish/h.
6. Anglers reported catching 33,340 rainbow trout and harvesting 25,280 of them. The number harvested was about 50% of the number of catchable rainbow trout stocked during the survey period.
7. The number of brown trout harvested (720) was only 14% of the number stocked in 2001. Anglers released 52% of the 1,501 brown trout they reportedly caught.
8. The number of trout harvested by anglers who had completed fishing when interviewed averaged 3.00 (SE = 0.45) trout per angler; those same anglers reported catching an average of 3.90 (SE = 0.52) trout per trip.
9. Twenty percent of the 934 anglers interviewed were out-of-state residents. Tennessee anglers came from 51 counties and most Tennessee anglers did not reside in the counties adjacent to the river. Residents of Clay County, through which the Obey River flows, accounted for only 9% of all anglers interviewed. Most (67%) anglers used bait; few (6%) anglers were flyfishing.
10. Excellent access to the creek carrying the effluent from Dale Hollow National Fish Hatchery was created since the last creel survey was performed in 1995. The creek was routinely stocked in 2001 and anglers frequented it throughout the survey. On weekends, 28% of all the anglers counted on the tailwater were fishing the creek; that percentage climbed to 54% on weekdays when dam discharges were typically higher.
11. Despite the fact that anglers could safely fish the hatchery creek during high dam discharges, fishing pressure over comparable periods was about 32% lower in 2001 than in 1995 ( $P = 0.10$ ). Lower pressure in 2001 was not due to higher dam discharges because mean daily discharge was actually lower in 2001 than in 1995.
12. Although the catch rate (both species combined) dropped slightly in 2001 compared to 1995 (1.18 and 1.39 fish/h, respectively;  $P = 0.01$ ) the harvest rate did not decline significantly ( $P = 0.10$ ) and the catch and harvest of trout per trip did not change since 1995 ( $P \geq 0.35$ ).

## INTRODUCTION

The Tennessee Wildlife Resources Agency (TWRA) intensively manages the trout fishery on the Obey River below Dale Hollow Dam. A US Army Corps of Engineers (USACOE) campground and the Dale Hollow National Fish Hatchery are located adjacent to the tailwater and many tourists take advantage of the trout fishing opportunity the tailwater provides. Between March and October 2001, a roving creel survey was used to examine fishing pressure and harvest rates by trout anglers fishing the Obey River. Attributes of the anglers using the resource for that 8-month period were also examined. The tailwater was last surveyed in 1995 (Bettoli 1996).

## STUDY AREA

Dale Hollow Dam is located on the Obey River about 12 km (7.5 miles) from its confluence with the Cumberland River (Figure 1). A USACOE campground is situated on the banks of the river, about 1 km downstream of the dam. Campers have easy access to the river provided by several fishing piers and a walkway that extends the length of the park. Boat ramps, public restrooms, and extensive picnicking facilities help attract citizens to the tailwater recreation area. Several fishing piers that extend out over the water are present and tend to concentrate anglers, particularly senior citizens, anglers with children, and handicapped anglers. A private campground is located on the lower reaches of the tailwater, just upstream of Highway 53. The Dale Hollow National Fish Hatchery is adjacent to the river and also attracts tourists to the tailwater. A paved walking path along the creek draining the hatchery (hereafter the “hatchery creek”) provides easy access to that previously unfished part of the tailwater.

The dam was constructed in 1945 and maximum discharge through each of three turbines is about  $57 \text{ m}^3/\text{s}$  (2,000cfs); under normal operating conditions, maximum discharge through each turbine is about  $50 \text{ m}^3/\text{s}$  (1,800 cfs). Like other Tennessee tailwaters, the river is unfishable by wading anglers during hydropower generation. A continuous minimum flow of  $0.7 \text{ m}^3/\text{s}$  (25 cfs) is provided. When dissolved oxygen (DO) concentrations in the discharge drop to critical levels (below 2 mg/L), the USACOE initiates special operations, whereby the turbines are half-loaded to aerate the water. Since 1999, the USACOE has been evaluating the use of hub baffles to increase DO concentrations in late fall.

The Tennessee Wildlife Resources Agency and the U.S. Fish and Wildlife Service maintain this put-and-take fishery with frequent stockings of catchable trout, mostly rainbow trout. Catchable rainbow trout ( $n = 60,727$ ) were stocked at approximately weekly intervals throughout the year in 2001; during

most stocking events, rainbow trout were released at the Moody Ramp and into the hatchery creek. In March 2001, all of the brown trout allocated to the river ( $n = 5,000$ ) were stocked.

## METHODS

The roving creel survey began March 1 and ended October 31, 2001. The reach of the river stocked with trout and frequented by anglers is short; therefore, the survey did not have to be stratified by area. The survey was stratified by month and kind-of-day. During the eight-month survey, a clerk worked most weekend days and holidays and about 8 weekdays each month. Sample days were chosen at random. The average number of daylight hours each day during the first half and last half of each month was determined and each workday was then divided into morning (dawn to midday) and afternoon (midday to sunset) shifts. The AM and PM shifts that were surveyed were randomly chosen with equal probabilities.

The clerk counted anglers twice each work shift. The reach of the river where counts were made ran from the dam to the middle of Walker Bend and between the Highway 53 bridge and the lower campground. The clerk recorded the number of vehicles parked on State Highway 53 just downstream of the Moody Ramp access because anglers used that pull-off area to access the river. The count was adjusted upward by one for each vehicle observed. The distance between the dam and the Highway 53 bridge was about 8 km (5 miles). The time to start the first count was randomly selected from a list of possible start times for each shift, beginning at daylight (or midday) and every 30 minutes thereafter until 2 hours before the end of the shift. The second count was made two hours after the first count began and the average of the two counts was used in subsequent calculations of fishing effort. Before and after each count, the clerk interviewed anglers.

If anglers agreed to be interviewed, they were asked how long they had been fishing, whether they were finished fishing, and how many trout of each species they had caught. Anglers were asked their state of residency and Tennessee residents were also asked for their county of residence. The clerk recorded the method of fishing used by each angler and measured (total length, cm) any trout in the creel.

Mean daily counts were expanded to estimate effort in each stratum (i.e., kind-of-day) and then pooled to estimate effort each month following the methods of Pollock et al. (1994). Average catch and harvest rates were measured using the mean of ratios method, which is recommended for roving creel surveys (Pollock et al. 1997); interviews of parties that had been fishing for less than 30 minutes were

excluded from the analysis. Total catch and harvest of each trout species were then estimated for each month. Standard errors of catch, harvest, and effort each month were calculated according to Pollock et al. (1994). A spreadsheet program performed all necessary calculations. The mean-square-successive-difference-between-months procedure was used to calculate the variance of total fishing pressure and harvest during the survey.

The length of time each completed-trip party had fished was used to calculate average trip length. Estimated fishing pressure was then divided by mean trip length to estimate the number of trips anglers made to the tailwater.

## **RESULTS and DISCUSSION**

### **Fishing Pressure**

Fishing pressure over the eight-month survey totaled 27,945 h (Table 1). Average trip length was 2.56 h; thus anglers made 10,914 trips to the tailwater over the survey. Over a comparable six-month period (April – September) fishing pressure was about 32% lower in 2001 (22,144 h) than in 1995 (32,630 h;  $P = 0.10$ ). As in 1995, fishing pressure in 2001 peaked in June and July.

Angler counts early in the 2001 survey suggested that fishing pressure would be higher than in 1995 due to the improved access and use of the hatchery creek, high angler use of that part of the tailwater did not translate into higher overall fishing pressure. The creek apparently attracted anglers who would normally have fished the main river channel. On weekends, 28% of the anglers observed on the tailwater were on the hatchery creek and on weekdays, most (54%) of the anglers counted were using the creek.

### **Catch and Harvest**

Anglers reported high catch rates for rainbow trout (mean = 1.14 fish/h; SE = 0.06,  $n = 517$ ). Catch rates for brown trout were low (0.05/h; SE = 0.01), as would be expected considering that only 5,000 brown trout were stocked in 2001. The pooled (both species) catch rate in 2001 (1.18 fish/h) decreased from 1995 (1.39 fish/h; t-test;  $P = 0.001$ ); however, pooled harvest rates in 1995 and 2001 (0.99/h and 0.88/h, respectively) were similar (t-test;  $P = 0.10$ ).

Over the entire survey, anglers reported catching 33,340 rainbow trout, of which an estimated 25,280 were harvested (Table 1). The difference between the number of rainbow trout harvested and the number caught represented a release rate of 24%, nearly identical to the rate observed in 1995 (26%). The number of rainbow trout harvested during the 2001 survey was about 50% of the total number of rainbow trout stocked between March and October 2001. Although fishing pressure was lower in 2001, the return rate was higher than in 1995 (~ 40%) because fewer trout were stocked in 2001.

The number of brown trout harvested in 2001 ( $n = 1,501$ ) was 30% of the brown trout stocked during the survey (5,000 fish). More brown trout were stocked in 1995 ( $n = 9,000$ ) and the return rate that year was substantially lower (13%). Anglers reported catching 1,501 brown trout in 2001 and the release rate was 52%, nearly identical to the release rate in 1995 (54%).

The mean number of trout harvested by complete-trip anglers was 3.0 fish ( $n = 41$ ;  $SE = 0.45$ ). Most (71%) anglers harvested at least one trout per trip. Those same anglers reported catching an average of 3.90 ( $SE = 0.52$ ) trout per trip; nearly all anglers (90%) caught at least one trout per trip. Neither of these rates changed significantly from 1995 (t-tests;  $P \geq 0.35$ ).

The total lengths of rainbow trout harvested by anglers reflected the size distribution of rainbow trout stocked throughout the year. Most (93%) of the rainbow trout observed in the creel were between 20 and 30 cm total length (Figure 2). Large trout held at the hatchery for display were occasionally stocked and some of the larger ( $> 40$  cm TL) rainbow trout observed in the creel may have been those fish. Only 14 brown trout were observed in the creel, including one large ( $> 50$  cm TL) individual. The brown trout shorter than 22 cm were probably all stocked in March 2001.

### Angler Characteristics

Eighty percent of the 934 trout anglers interviewed on the Obey River in 2001 were Tennessee residents (Figure 2), similar to the rate in 1995 (82%). Indiana, Kentucky, and Ohio residents each represented 4-6% of the anglers interviewed and 5% of the anglers were from 10 other states. These percentages changed little from the 1995 survey. Most of the anglers who fished the Obey River did not live in the counties adjacent to the river, as in 1995. Tennessee anglers fishing the Obey River in 2001 came from 51 counties (Figure 3) and residents of Clay County, through which the Obey River flows, accounted for even fewer anglers in 2001 (9%) than in 1995 (16%). The counties with the highest representation were Putnam (11%), Sumner (10%), Clay, Hamilton (9%), and Jackson (6%).

In 2001 most (67%) anglers were using bait instead of artificial lures; however, more anglers fished with bait in 1995 (86%;  $X^2 = 189, P < 0.001$ ). The percentage of anglers interviewed who were flyfishing doubled from 3 to 6% between the 1995 and 2001 survey ( $X^2 = 22, P < 0.001$ ).

### **ACKNOWLEDGMENTS**

This research was supported by a grant from the Tennessee Wildlife Resources Agency. Additional matching funds were provided by the Tennessee Cooperative Fishery Research Unit and the Center for the Management, Utilization, and Protection of Water Resources, Tennessee Technological University.

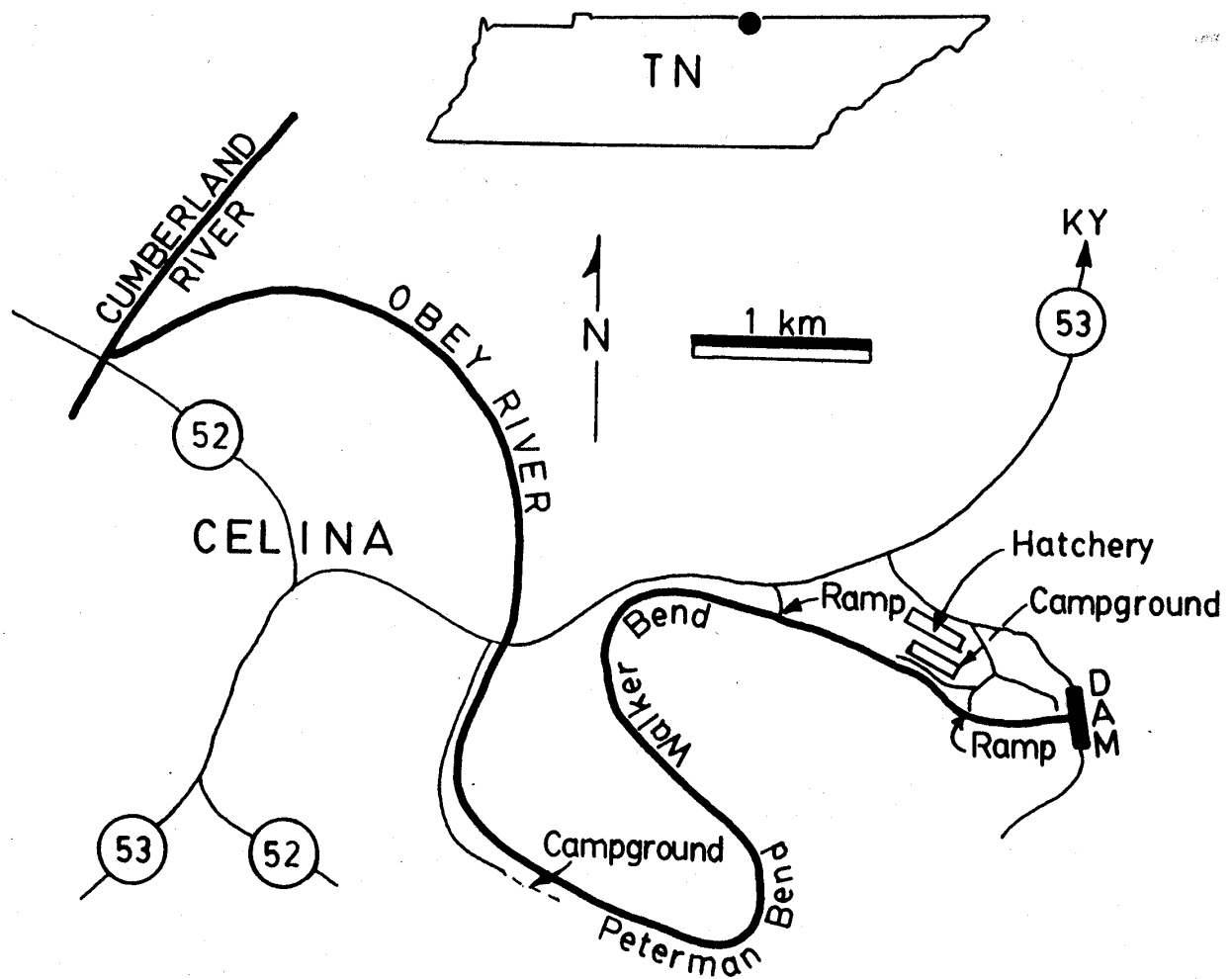
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- Bettoli, P.W. 1996. Survey of the trout fishery in the Obey River below Dale Hollow Dam. Fisheries Report 96-16, Tennessee Wildlife Resources Agency, Nashville.
- Pollock, K.H., J.M. Hoenig, C.M. Jones, D.S. Robson, and C.J. Greene. 1997. Catch rate estimation for roving and access point surveys. North American Journal of Fisheries Management 17:11-19.
- Pollock, K.H., C.M. Jones, and T.L. Brown. 1994. Angler survey methods and their applications in fisheries management. American Fisheries Society Special Publication 25.



Table 1. Fishing pressure and number of rainbow trout and brown trout caught and harvested by anglers fishing the Obey River, Tennessee, March – October 2001.

Month	Pressure (hours)	SE	Rainbows Caught	SE	Rainbows Harvested	SE	Browns Caught	SE	Browns Harvested	SE
March	2270	603	2789	772	2293	725	177	94	58	56
April	3353	1059	6348	3031	5749	2552	136	99	50	50
May	2886	746	2987	878	1807	537	18	18	18	18
June	4436	1488	5012	2074	2849	1169	142	72	108	65
July	4770	2051	6124	3412	4783	3319	414	299	105	62
August	3223	497	1949	340	1546	296	57	33	57	33
September	3476	857	5546	1742	4142	1461	303	249	70	46
October	3531	1438	2585	855	2111	829	254	105	254	105
TOTAL	27,945	1,907	33,340	6,254	25,280	5,537	1,501	411	720	161



**Figure 1. Map of the Obey River below Dale Hollow Dam.**

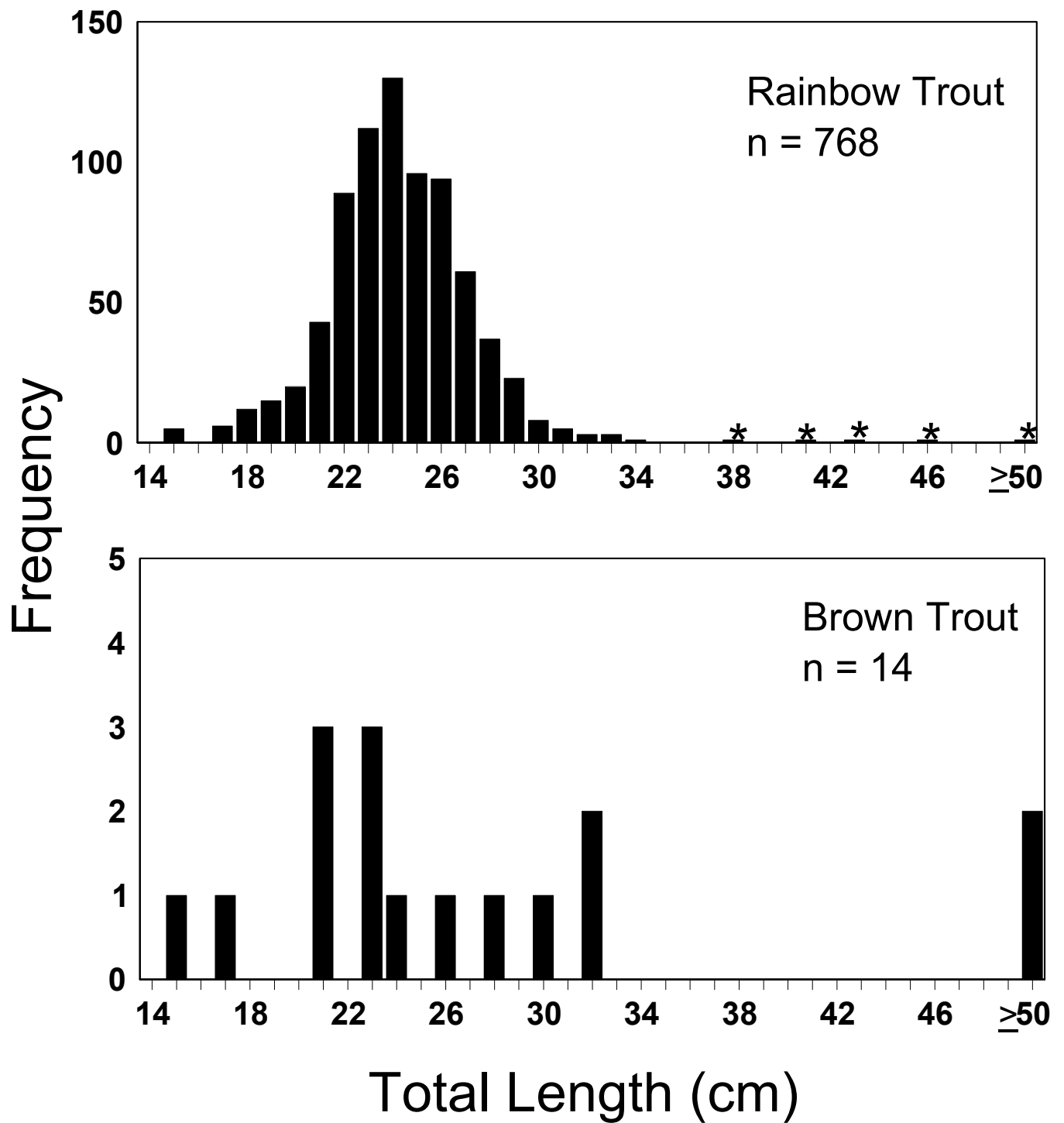


Figure 2. Length-frequency distributions for trout observed in the creel of anglers in the Obey River, March - October 2001. An asterik indicates one fish.

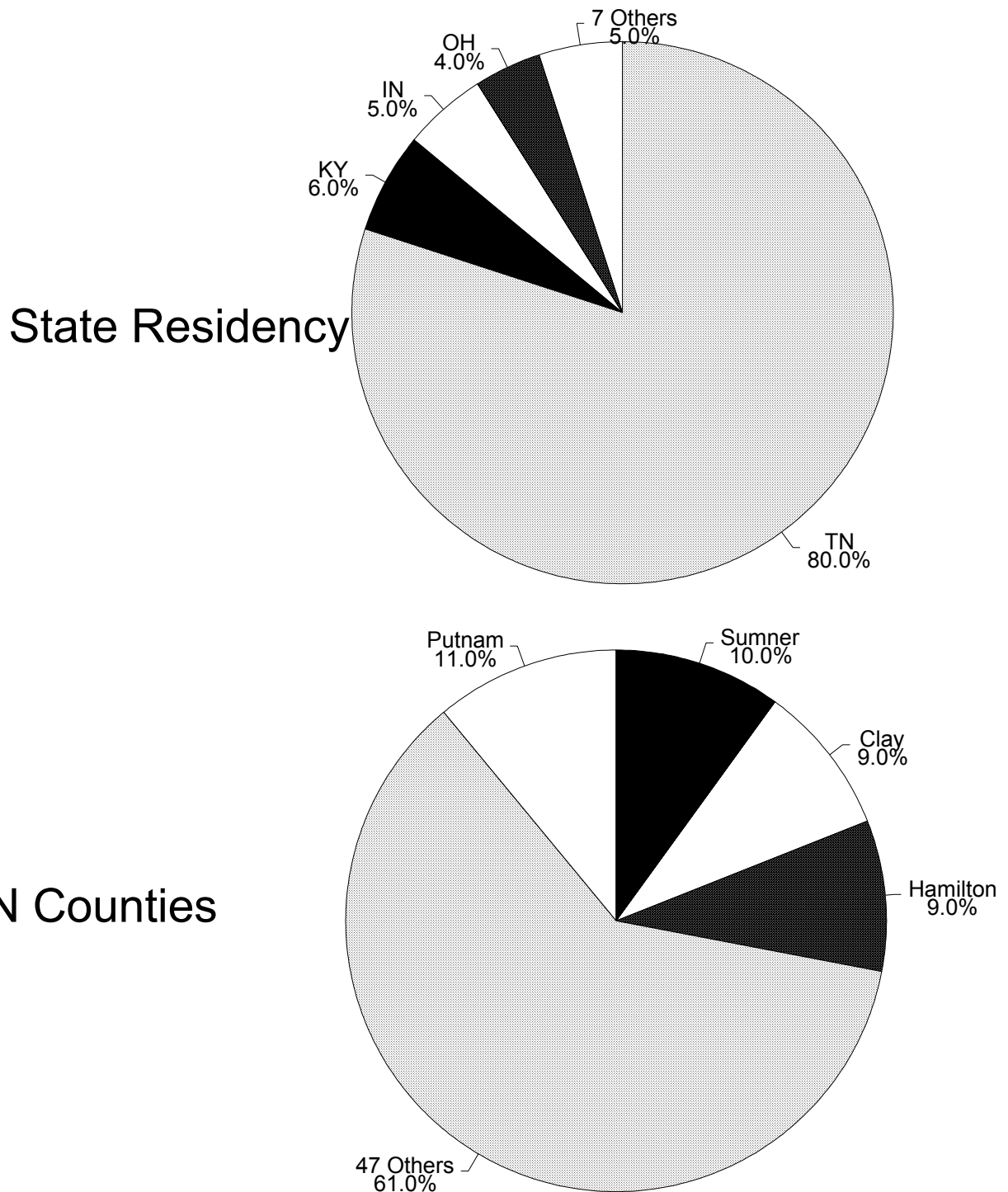


Figure 3. State residency and Tennessee county residency for anglers interviewed on the Obey River, March - October 2001.

## **APPENDIX**

Survey forms used during the creel survey on the Obey River, 2001.

## DAILY SAMPLE SHEET - OBEY 2001

DATE (month/day) \_\_\_\_\_ SHIFT \_\_\_\_\_ (AM or PM)

KIND OF DAY \_\_\_\_\_  
01 = weekday 02 = weekend/holiday

TIME of FIRST COUNT \_\_\_\_\_ TIME of SECOND COUNT \_\_\_\_\_

DISCHARGE WHEN \_\_\_\_\_  
FIRST COUNT BEGAN (Baseflow = 0 One or more turbines = 1)

	FIRST COUNT	SECOND COUNT
1. DAM		
2. FIRST RAMP-CAMPGROUND		
3. HATCHERY CREEK		
4. CREEK - MOODY RAMP		
Vehicles parked on Hwy 53		
5. below Moody Ramp		
6. PETERMAN BEND		

TOTAL NUMBER OF ANGLERS \_\_\_\_\_

Water Temperature (Centigrade) during first count (at first ramp) \_\_\_\_\_

End Mileage = \_\_\_\_\_  
Beginning Mileage = \_\_\_\_\_  
Total Mileage = \_\_\_\_\_

Clerk \_\_\_\_\_

## INTERVIEW SHEET - OBEY 2001

DATE (Month / Day) \_\_\_\_\_ INTERVIEW NUMBER \_\_\_\_\_

KIND-OF-DAY \_\_\_\_\_ COMPLETED TRIP ? \_\_\_\_\_  
[ Weekday = 1 Weekend / holiday = 2 ] Yes = 1 No = 2

NUMBER IN PARTY \_\_\_\_\_ Start of Fishing \_\_\_\_\_

SPECIES FISHED FOR \_\_\_\_\_ End of Fishing \_\_\_\_\_  
(or time of interview)

(1) Trout \_\_\_\_\_

(2) Anything/Other \_\_\_\_\_

Time Fishing \_\_\_\_\_  
By Party \_\_\_\_\_  
Hours \_\_\_\_\_  
Minutes \_\_\_\_\_

Number of Rainbow Trout **CAUGHT** = \_\_\_\_\_ (ENTER "0" IF NONE)

Number of Rainbow Trout **KEPT** = \_\_\_\_\_ (ENTER "0" IF NONE)

LENGTHS OF RAINBOWS ( NEAREST cm) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Number of Brown Trout **CAUGHT** = \_\_\_\_\_ (ENTER "0" IF NONE)

Number of Brown Trout **KEPT** = \_\_\_\_\_ (ENTER "0" IF NONE)

LENGTHS OF BROWNS ( NEAREST cm) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

OTHER SPECIES HARVESTED (species / number) \_\_\_\_\_

For METHODS, TERMINAL GEAR, and LOCATION, the numbers entered should add up to the number in the party.

**METHODS:** STILLFISHING \_\_\_\_\_ SPINCASTING \_\_\_\_\_ FLYFISHING \_\_\_\_\_

**TERMINAL GEAR:** ARTIFICIAL LURES or FLIES \_\_\_\_\_ BAIT \_\_\_\_\_

**LOCATION:** ON BANK \_\_\_\_\_ WADING \_\_\_\_\_ IN BOAT \_\_\_\_\_

**STATE** \_\_\_\_\_ **AND COUNTY (IF TENN)** \_\_\_\_\_ **RESIDENCE** \_\_\_\_\_